Machine Learning
Lab Assignment 9
SVM & K-Means

Question 1

Learn a SVM classifier on iris dataset. You can perform one vs all multiclass classification.

- **Hard-margin**
  - Using CVXPY learn a hard-margin SVM classifier on the dual problem.
  - Normalize the data and then perform same experiment on normalized data.
  - Plot the decision boundary (separating hyperplane) in dark black and the margins in dotted lines. Encircle the support vector points.
- **Soft-margin**
  - Using CVXPY learn a soft-margin SVM classifier on the dual problem.
  - Normalize the data and then perform same experiment on normalized data.
  - Plot the decision boundary (separating hyperplane) in dark black and the margins in dotted lines. Encircle the support vector points.
- **sklearn**
  - Use sklearn SVM classifier and perform classification on dataset.
  - Normalize the data and then perform same experiment on normalized data.
  - Plot the decision boundary in dark black and the margins in dotted lines. This time use SKlearn's SVM with a linear kernel. Encircle the support vector points. Do you get the same answer as when you use your own SVM?
- Compare your results in all three cases

Question 2

Implement k-means clustering algorithm. Use the two dataset (Q2a and Q2b) files for the following:

a) Visualize the datasets.

b) Use random initial cluster centers and try the algorithm for different values for K (i.e. K = 1, 2, 3...)

c) Visualize the cluster formation for each value of K for both the datasets.

d) Utilize the Elbow method to find out the optimal number of Clusters (i.e. K)